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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Gustav Wallmark et al

TITLE: METHOD AND MEANS FOR 2-D-GEL-IMAGE SEGMENTATION

AMENDED CLAIMS

1-21. (cancelled)

22. (new) A method for segmenting a 2D gel image by associating initial protein seed candidates with surrounding regions, comprising the steps of:
- defining at least one interface circumscribing an initial seed in its immediate surrounding,
- defining a velocity function F(x, y) for said interface,
- bringing said interface to evolve in accordance with F(x, y),
- defining at least one stopping criterion C and stopping the evolution of said interface in accordance with said criterion,
- associating the area inside said stopped interface with said initial seed.

23. (new) The method according to claim 22, comprising the steps of:
- calculating the time of arrival, $T_a(x, y)$ for said evolving interface in pixels surrounding said initial seed
- defining said stopping criterion C so that C depends on $T_a(x, y)$ in the pixel representing the latest circumscribed pixel by said evolving interface and/or functions thereof.

24. (new) The method according to claim 23 wherein said stopping criterion C depends on the gradient T_a' of $T_a(x, y)$ in the pixel representing the latest circumscribed pixel by said evolving interface and/or functions thereof.

25. (new) The method according to claim 22, wherein said stopping criterion C is defined so that C depends on F(x, y) and/or functions thereof.

26. (new) The method according to claim 22, wherein the evolution of said interface is carried out by
- defining and calculating a time of arrival, $T_a(x, y)$, for a set of trial candidate pixels,
- identifying the trial candidate pixel P_{Tmin} with the smallest T_a, and
- letting the interface evolve to said trial candidate pixel P_{Tmin}.

27. (new) The method according to claim 26, comprising the step of
- rejecting a trial candidate pixel as a candidate pixel if it is established that said candidate trial pixel constitutes a pixel representing a known pixel associated with an

evolving interface originating from another initial seed.

28. (new) The method according to claim 22, wherein the evolution of said interface is carried out by:

- an iterative calculation of $T_a(x, y)$ for a set of candidate pixels,
- defining and calculating a departure time, T_d, for said candidate pixels,
- identifying the candidate pixel P_{Td} with the smallest T_d,
- letting the interface propagate to said pixel points, P_{Td}, outside or inside neighbours depending on the sign of the speed function F in said point P_{Td}.

29. (new) The method according to claim 28, comprising the step of

- rejecting a trial candidate pixel as a candidate pixel if it is established that said trial candidate pixel constitutes a pixel representing a known pixel associated with an evolving interface and that the value of the speed function F(x, y) in said trial candidate pixel is positive.

30. (new) The method according to claim 22, comprising the following steps

- defining a first function $F_1(x, y)$,
- defining at least a second function $F_2(x, y)$ differing from $F_1(x, y)$,
- defining a criterion C2 for at least an amount of pixels inside a region of said image, wherein said criterion C2 defines weather $F_1(x, y)$ or $F_2(x, y)$ is valid for said amount of pixels.

31. (new) The method according to claim 30, wherein said criterion C2 is a criterion for identifying saturated regions.

32. (new) The method according to claim 22, wherein F(x, y) depends on the intensity function I(x, y) for said image and/or functions thereof.

33. (new) The method according to claim 22 , wherein F(x, y) depends on the distance to said initial seed and/or functions thereof.

34. (new) The method according to claim 22, wherein F(x, y) depends on the curvature of said evolving interface and/or functions thereof.

35. (new) The method according to claim 22, wherein F(x, y) depends on the normal direction of said evolving interface and/or functions thereof.

36. (new) The method according to claim 22, wherein F(x, y) depends on the curvature of the intensity function I(x, y) and/or functions thereof.

37. (new) The method according to claim 22, wherein F(x, y) depends on the gradient G(x, y) of the intensity function I(x, y) for said image and/or functions thereof.

38. (new) The method according to claim 22, wherein F(x, y) depends on the shape of said evolving interface and/or functions thereof.

39. (new) The method according to claim 22, wherein F(x, y) depends on the angle between the intensity gradient, $\overline{G}$, of I(x, y), and a vector $\overline{V}$ representing the

instantaneous distance to (x, y).

40. (new) A computer program element to be used for the segmentation of a 2D gel image by associating initial protein seed candidates with surrounding regions, said program element comprising computer program code means making a computer execute the steps defined by any of above claims 22-39.

41. (new) A computer readable medium, comprising computer program code means making a computer execute the steps defined by any of above claims 22-39.

42. (new) A system for processing 2D gel images comprising a computer, wherein said computer has access to a program element computer to be used for the segmentation of a 2D gel image by associating initial protein seed candidates with surrounding regions, said program element comprising computer program code means making a computer execute the steps defined by any of above claims 22-39.